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by Marc Frenette

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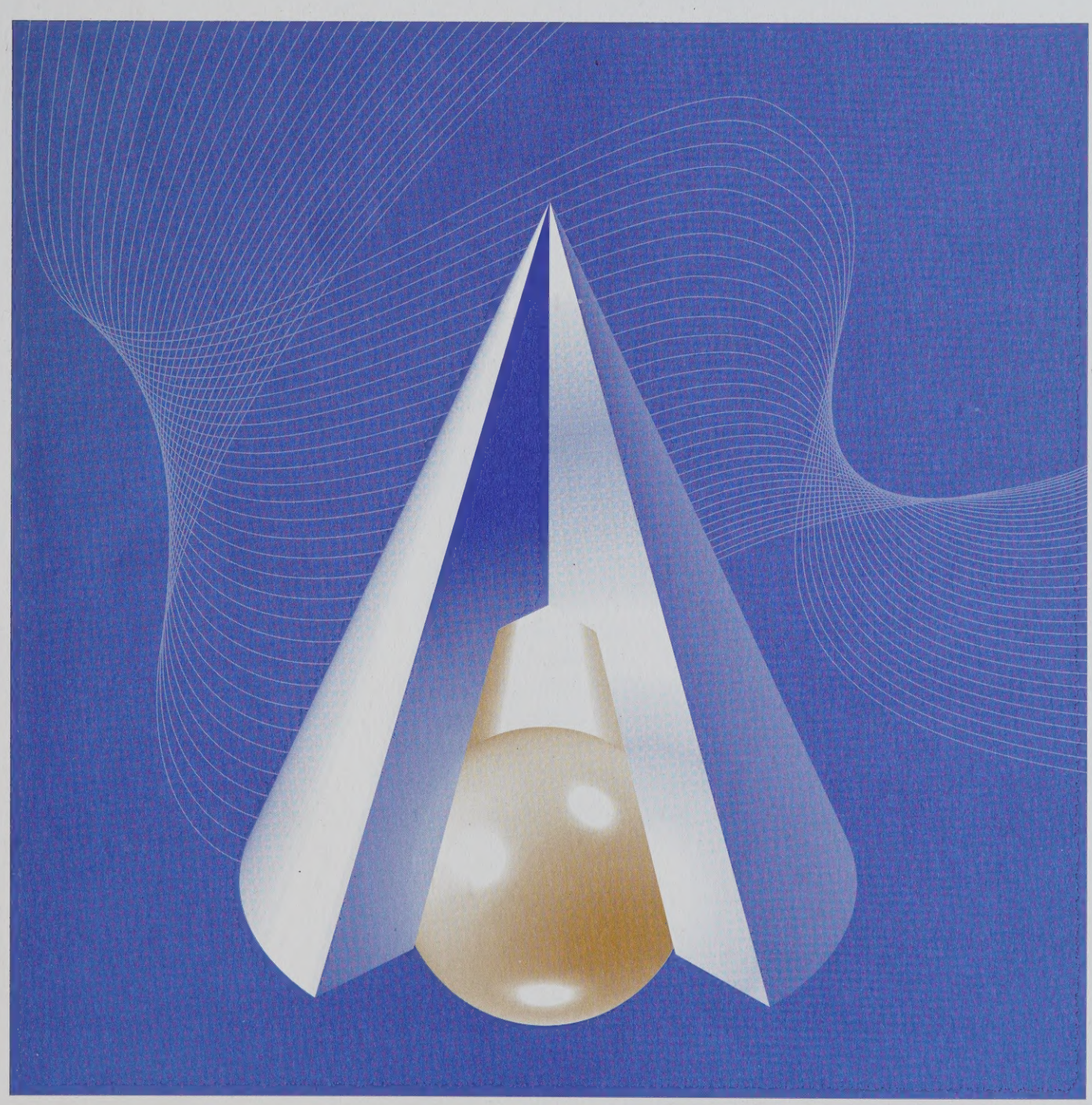

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Abstract

This comparative study investigates the role of family background characteristics in post-secondary access in Canada and the United States. Given that post-secondary schooling is funded very differently in the two countries, family background may play substantively different roles. The findings suggest that university-going is less common among lower-income students and members of a visible minority group in the U.S. than among their Canadian counterparts. Some possible reasons are discussed.

Keywords: Post-secondary access, social mobility, intergenerational income mobility

1. Introduction

In many developed countries, two interesting trends have emerged regarding university education. First, the economic returns associated with holding a university degree appear to be rising. Second, countries such as Canada, the United States, the United Kingdom, Australia, and others have moved towards a system of increased student financial responsibilities. This raises the possibility that students from disadvantaged backgrounds face reduced access to an investment with an increasing rate of return.

Not surprisingly, the issue of university access has moved to the forefront of debates among stakeholders in university systems around the developed world. As the burden of financing a university education is shifted more towards students, it is becoming increasingly important to understand the extent to which students from lower socio-economic backgrounds are affected. A detailed understanding of the characteristics of students who go on to university (and of those who do not) provides a framework for assessing the level of social mobility in an economy, which is a critical component in discussions regarding poverty reduction and self-sufficiency among society's most vulnerable. Understanding the factors underlying post-secondary access is important from a skills development point of view, especially in light of the ageing population in many industrialized nations and increased global competition.

The Canadian research on university access suggests that parental education is perhaps the most important predictor of university enrolment. Although parental income also plays a role, it is generally found to be smaller than the role of parental education. This may stem from the fact that most of Canada's university programs are publicly funded and have tuition fees that may be affordable to many students. In contrast, many universities in the United States (U.S.) are privately funded, which has two implications.[1] First, tuition fees in these schools are considerably higher than in Canadian schools, and thus, may not be affordable for many students. In the 2000-01 academic year, tuition at U.S. private universities averaged $19,414. Second, since 32% of U.S. universities are private, their presence may crowd out public sector schools (through reduced demand from richer students), leaving fewer affordable options for lower-income students. In fact, there is evidence that U.S. students are less likely to be situated near a public university than their Canadian counterparts. Do (2004) finds that 51% of U.S. students went to a high school near a public university (in the same county), while in Canada, Frenette (2004) finds that 83% of high school students lived near a public university (within 80 km of straight-line distance). Moreover, tuition fees in the public system are themselves higher in the U.S. than in Canada. On average, students paid $4,382 in tuition in U.S. public universities, which is 31% more than the $3,334 paid to attend Canadian universities.[2]

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1. In the U.S., universities are often called "four-year colleges".

2. The U.S. tuition fees numbers were taken from various tables in the Digest of Education Statistics, 2003 edition, available from the National Center for Education Statistics at http://nces.ed.gov/programs/digest/d03. The Canadian data on tuition fees were obtained from Statistics Canada's August 27th, 2001 edition of The Daily, available at http://dissemination.statcan.ca/Daily/English/010827/d010827b.htm. The dollar figures used here (and henceforth) are expressed in 2001 Canadian dollars, using Statistics Canada's purchasing power parities with regards to household final consumption expenditure between Canada and the U.S. (CANSIM table 380-0057).

Of course, student loans may help some students cover the extra costs in the U.S., although the data suggest that these were no more available to U.S. students than to Canadian students. In the 1999-00 academic year, the average loan amount among full-time, full-year undergraduates in private and public universities in the U.S. was about $7,000. In Canada, the average loan amount was about $6,700 among all undergraduates. Although a U.S. figure comparable to the Canadian data (i.e., all undergraduates in public institutions) is not available, it would most likely be lower than $7,000 for two reasons. First, loan amounts are generally lower for part-time students. Second, loan amounts in the U.S. rise moderately with family income, which may be indicative of higher loans awarded to students attending private institutions.[3]

The upshot of this discussion is that one might expect to find that parental income matters more in the U.S. than in Canada. The main objective of this study is to assess the validity of this expectation by estimating the role of household income in university enrolment in Canada and the U.S., which informs debates on student-financing and social mobility alike. The question of social mobility is an important one, as previous research has found that earnings mobility is higher in Canada than in the U.S. (Solon, 2002).

Of course, many students decide to attend college instead. For completeness, the study also analyzes the decision to participate in college programs, which refer to community colleges or CEGEPs (Collège d'Enseignement Général et Professionnel) in Canada and two-year colleges in the United States.

Equity in post-secondary access can be measured across many dimensions. Does parental education matter more in one country? Do females or members of a visible minority group have better odds of enrolling in post-secondary (PS) studies in one country than in the other? Since a PS education is linked to higher earnings, answering these questions can inform debates on the reasons why certain groups fare chronically worse than others in the labour market. Although many studies have investigated the role of socio-economic background in PS access separately by country, very few have compared these roles across countries, and none have done so across Canada and the United States.

The main finding of the study is that two groups of students appear to be disadvantaged in terms of university-going in the U.S., relative to their Canadian counterparts: students from lower-income families and members of a visible minority group. The disadvantage faced by lower-income students from the U.S. is interesting in light of the fact that university-going is far more common in the U.S. than in Canada when we look at higher points in the income distribution. Among members of a visible minority group, they actually hold an advantage over non-members in Canada; in the U.S., both groups have equal odds of going on to university.

The study begins by summarizing various studies conducted in Canada and the U.S. on PS access with respect to the role of costs and socio-economic characteristics (Section 2). The estimation methods used in the study are outlined in Section 3. The next three sections comprise the core of the paper: the data used in the study are described in Section 4 and the results are presented in Section 5 and discussed in Section 6. Finally, the study is summarized in Section 7.

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3. The U.S. loan numbers were taken from various tables in the Digest of Education Statistics (see footnote 2), while the Canadian data were derived from Junor and Usher (2002).

2. Literature review

Two questions often posed in the literature on post-secondary access are, "Do costs deter students from going on?" and "Who goes on?" I begin this literature review by summarizing the main works and issues surrounding the role of costs in post-secondary access, followed by an overview of the growing literature on the role of socio-economic characteristics.

The traditional approach to assessing the role of student costs consisted of exploiting the variation in student costs and enrolment rates among jurisdictions (i.e., provinces or states) and across time, or by examining the enrolment gap across the income distribution in different student-cost regimes. Tuition fees were normally used to measure student costs, but some studies have examined the role of student aid as well.

An issue with the temporal variation in tuition fees is that it may be endogenous: that is, governments may anticipate changes in demand and thus, alter funding accordingly. In other words, changes in enrolment rates may reflect shifts in (as opposed to movements along) the demand curve. Although differences in tuition fees across jurisdictions may be exogenous, there are normally few jurisdictions, and thus, too few data points. An alternative approach offering more degrees of freedom is to exploit micro-level data on the household income of students exposed to different tuition fee regimes. Although this is not a direct assessment of the role of tuition fees, it can be argued that if higher tuition deters some students from attending university, we might expect that lower-income students would be the most negatively affected. This is, in fact, the approach that the majority of the literature has taken in recent years.

Some authors have examined differences in enrolment probabilities by household income over time. In Canada, Christofides, Cirello, and Hoy (2001) examine the changing role of parental income from 1975 to 1993, and Corak, Lipps, and Zhao (2003) extend this analysis to 1997 to cover the period when tuition began to rise in a more substantial manner. Another distinction between the two studies is that CCH look at post-secondary education in general, while CLZ also examine university education separately. While CCH find no evidence of an increased income access gap in post-secondary enrolment, CLZ find that the gap in university access increased in the early 1990s (when tuition began to rise substantially), only to subside in the mid to late 1990s (when student-aid programs were altered to meet the changing needs of lower-income students). Drolet (2004) extends the CLZ study to the year 2001, and finds that the income-access gap has remained stable. In the U.S., Ellwood and Kane (2000) find that the income access gap in university enrolment rose throughout the 1980s.

Other authors have combined micro-data on household income with aggregate data on tuition differences. In Canada, Coelli (2004) and Rivard and Raymond (2004) exploit differential increases in tuition fees in various provinces during the 1990s. While Coelli finds that students from lower-income families are more negatively affected by increased university tuition fees, Rivard and Raymond find no effect. One possible reason for the discrepancy is that Ontario and Quebec are

excluded from the analysis in Rivard and Raymond since these provinces host very different PS education systems, which are not conducive to the models estimated by the authors.[4]

U.S. studies by Radner and Miller (1970), Bishop (1977), Kohn, Manski, and Mundel (1976), Manski and Wise (1983), McPherson and Schapiro (1991), and Kane (1994 and 1996) assess student responsiveness in enrolment probabilities to changes in student costs by income level, and find that lower-income students are more affected than higher-income students. Other U.S. studies have found evidence suggesting that students across the income spectrum have the same response to changes in student costs (Cameron and Heckman [1998] and Ellwood and Kane [2000]).

Another important component of the student financial burden is the cost associated with locating away from the home to complete PS studies. In Canada, Frenette (2004, 2005) looks at the role of the geographic distance separating students from the nearest university and/or college while they are in high school, which can serve as a proxy for having to bear the costs of moving and living away from their parents' home in order to attend. The studies find that added distance is associated with lower attendance probabilities, especially for lower-income students. In the U.S., Card (1995) finds that students who grew up without a college nearby obtained about one year less schooling on average.

Since a PS education is associated with higher earnings, understanding who goes on may help explain why certain groups chronically fare worse in the labour market than others. This disadvantage can be seen across generations within families (Fortin and Lefebvre [1998] and Corak and Heisz [1999] in Canada; Eide and Showalter [1999] in the U.S.) or within certain socio-economic groups, such as members of a visible minority group (Pendakur and Pendakur [2002] in Canada; Antecol and Bedard [2004] in the U.S.), immigrants (Baker and Benjamin [1994], Bloom, Grenier and Gunderson [1995], Grant [1999], and Frenette and Morissette [2005] in Canada; Borjas [1985] and Butcher and DiNardo [2002] in the U.S.), or women (Kidd and Shannon [1994] and Drolet [2002] in Canada; Polachek and Robst [2001] in the United States).

As previously discussed, several studies have correlated the changing role of household income under different student-cost regimes for the purpose of evaluating the role of student-costs in PS enrolment. The actual magnitude of the income access gap observed in a given jurisdiction at a given point in time has value in its own right since it addresses the extent of the disadvantage faced by students from lower-income families in obtaining a PS education, and thus, potentially avoiding the plight of their parents (whether this is associated with costs or not). The Canadian and U.S. studies already listed suggest that these students are indeed less likely to enrol in PS studies than students from more well-to-do families, although the impact is generally greater for university-going than for college-going.

4. Another possible reason is that the authors must impute parental income using information on parents' occupation, and Census information on the relationship between occupation and earnings.

An important issue in correlating parental income with PS enrolment in many studies is the use of cross-sectional data, which contains no information on parental income if the student moved away and is not listed as living with his or her parents. This may understate the income access gap if the decision to move away to attend school is correlated with household income. In this study, I circumvent this problem by using longitudinal data that follows students from their time in high school to a few years beyond.[5,6]

Aside from parental income, some students may also benefit from their parents educational background. The literature appears to be even more in agreement on the strong positive role played by parental education in raising the educational attainment of their children. In Canada, some of studies include de Broucker and Lavallée (1998a and 1998b), Butlin (1999), Bouchard and Zhao (2000), Knighton and Mirza (2002), and Finnie, Laporte, and Lascelles (2004). Some U.S. studies include Johnson (2002), Belzil and Hansen (2003), and Plug and Vijverberg (2003). Plug and Vijverberg investigate the issue further by using data on biological and adopted children, and conclude that 55% to 60% of the intergenerational education correlation is related to genetic transmission. In both countries, parental education plays a stronger role in university-going than in college-going.

There is also agreement in the literature that females are more likely to go on to PS studies. In Canada, Butlin (1999) and Frenette (2004, 2005) find that females are substantially more likely to attend college and university, and Finnie, Laporte, and Lascelles (2004) report that this gap has been widening over the 1990s. Recent U.S. studies have also found that female students are more likely to go on to PS studies than male students, and the gap has widened in recent years (e.g., Kane [1994] and Charles and Luoh [2001]). The authors of these studies argue that we can not attribute this widening gap to an increase in the education wage premium for women.

There is also much interest, particularly in the U.S., in examining enrolment gaps by ethnicity. Kane (2001) reports that while the racial (black-white) gaps in high school graduation and test performance have narrowed, the racial gaps in PS enrolment have actually widened. In Canada, more attention has been paid to the access gap between immigrants and Canadian-born students, although this is never the main focus of any of the major studies. Butlin (1999) and Finnie, Laporte, and Lascelles (2004) found that while immigrants were more likely to go to university or college, the results are usually not significant.

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5. Sensitivity tests suggest that using longitudinal data produces a stronger relationship between income and university-going than by using cross-sectional data (by a factor of 1.5). More details are available upon request.

6. Note that while most of the studies using cross-sectional data may understate the income access gap at any point in time, the objective is often to assess how the gap changes over time. Corak, Lipps, and Zhao (2003) argue that since the proportion of post-secondary students who consider their parents' home as their usual place of residence has remained stable over the last two decades in Canada, there should be little or no bias in the estimate of the evolution of the income access gap. Arguing that the relationship between household income and the decision to move away to attend school is similar in Canada and the U.S. would require a more detailed analysis on the migration patterns of students.

3. Methods

If students could choose among a continuous set of educational levels, they would choose the optimal amount of schooling, S*, that maximizes the expected lifetime stream of discounted net returns of the schooling choice (i.e., discounted returns minus discounted costs, denoted by 'R-C' for simplicity), subject to credit constraints (S_c). The returns, costs, and credit constraints are, in turn, a function of observed (X) and unobserved (Z) individual characteristics.[7] Specifically, students behave as follows:

$$\underset{S^*}{Max}\, E[R(S \mid X,Z) - C(S \mid X,Z)]$$

$$S.T.\, S = S_c(X,Z)$$

In the estimation strategy, it is not necessary to know the actual costs and returns associated with higher studies. The objective is simply to assess how X impacts schooling decisions, which reveals how (perceptions of) net returns and/or credit constraints vary by observable characteristics.[8] In other words, differences in schooling choices across some socio-economic dimension are interpreted as being the result of differences in net returns or credit constraints. The latent continuous variable S* could thus, in theory, be modeled as follows:

$$S^* = X\beta + \varepsilon$$

Note that ε is a normally distributed disturbance term with mean zero and variance one, and contains any unobservable characteristics that may influence the schooling choice (Z). In reality, only the actual discrete choice S_j is observed, where j can equal 0 (no PS), 1 (college), or 2 (university) in this study. The value of S_j will depend on the value of S* relative to certain thresholds (μ_j). Specifically, we observe:

$$S = 0 \; if \; S^* \leq \mu_1$$

$$S = 1 \; if \; \mu_1 \prec S^* \leq \mu_2$$

$$S = 2 \; if \; \mu_2 \prec S^*$$

By taking probabilities and substituting ($X\beta + \varepsilon$) for S*, we get:

$$P(S=0) = P(X\beta + \varepsilon \leq \mu_1) = P(\varepsilon \leq \mu_1 - X\beta) = \Phi(\mu_1 - X\beta)$$

7. For example, certain individuals may obtain more returns from a university education over their life-course (e.g., men or younger individuals), while some may forego more earnings in the short run by attending university (e.g., those with a full-time job following high school). Others still may have greater access to credit sources if their parents can co-sign their loans.

8. See Lauer (2003) for a similar interpretation on a very closely related model.

$$P(S=1)=P(\mu_1 \prec X\beta+\varepsilon \leq \mu_2)=P(\mu_1 - X\beta \prec \varepsilon \leq \mu_2 - X\beta)=\Phi(\mu_2 - X\beta)-\Phi(\mu_1 - X\beta)$$

$$P(S=2)=P(\mu_2 \prec X\beta+\varepsilon)=P(\varepsilon \succ \mu_2 - X\beta)=1-\Phi(\mu_2 - X\beta)$$

The term Φ is the standard normal cumulative distribution function. The ordered probit model will use these probabilities in a maximum likelihood estimation to recover values for β, μ_1, and μ_2.[9]

Since the coefficients from the ordered probit model are difficult to interpret, it is preferable to show marginal probability effects. Noting that $\frac{\partial \Phi[f(t)]}{\partial t}=\frac{\partial f(t)}{\partial t}\phi[f(t)]$, where ϕ represents the probability density function of the standard normal distribution, we get the following marginal effect functions:

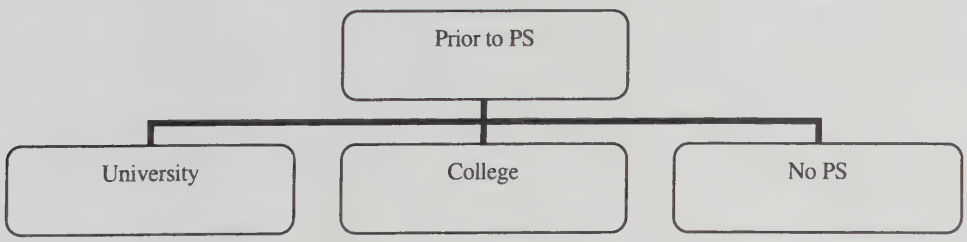
$$\frac{\partial P(S=0)}{\partial X}=-\phi(\mu_1 - X\beta)\beta$$

$$\frac{\partial P(S=1)}{\partial X}=[\phi(\mu_1 - X\beta)-\phi(\mu_2 - X\beta)]\beta$$

$$\frac{\partial P(S=2)}{\partial X}=[\phi(\mu_2 - X\beta)]\beta$$

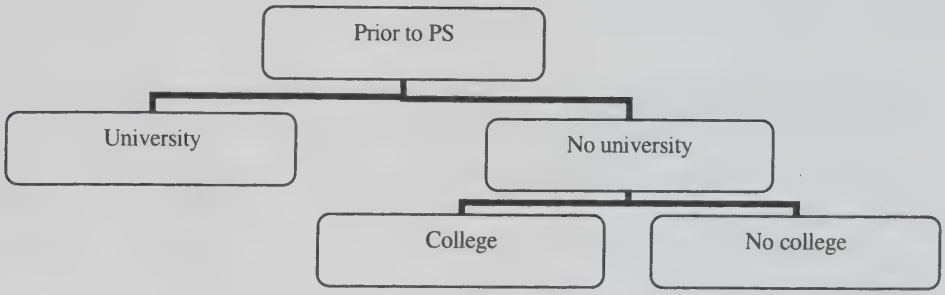
While an ordinal approach is an appropriate manner of displaying the hierarchy of educational *outcomes*, it may fail to take into account the hierarchy of educational *decisions* of students. Consider the following three decision paths regarding post-secondary schooling:

Path 1: Single decision

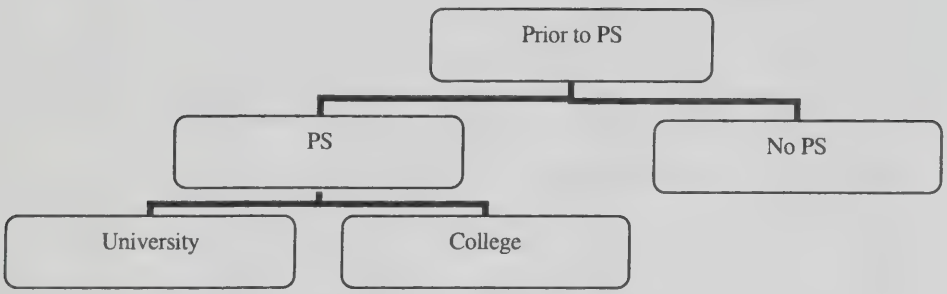


9. An ordered logit estimation approach was also taken, but this yielded no substantial change in the results. One could also estimate a multinomial model, which implies a trade-off of costs and benefits (Menard, 1996). Specifically, a model with N outcomes will require estimating N-1 coefficient vectors in a multinomial model, but only 1 coefficient vector plus N-1 thresholds in an ordinal model. As a result, estimates from multinomial models normally have higher standard errors than ordinal models. Nevertheless, a multinomial model imposes fewer restrictions than an ordinal model (e.g., an ordered logit model assumes equal slopes in the log odds ratio across outcomes). To ensure robustness, all results were verified with a multinomial logit model. Although the results were qualitatively similar, the low sample sizes (see the data section) and the large number of parameters meant that significance was often compromised. These results are available upon request.

Path 2: University decision first



Path 3: Post-secondary decision first



Under path 1, students decide among the three alternatives concurrently. Note that the ordinal model estimates this path. Under path 2, students first choose to attend university or not, and then decide on whether or not to attend college. Under path 3, students begin by deciding on whether or not to attend post-secondary schooling, and then decide on university or college. The 'correct' path likely depends on the individual. Paths 2 and 3 offer more detail than path 1, but in reality, the probability of each of the three outcomes in path 1 can be recovered from paths 2 and 3 by the laws of probability. However, there is one instance in which paths 1 and 3 can be misleading.

Suppose an ordinal model is estimated, and this shows that income is not strongly related to college-going (as is often the case). Does this mean that college costs do not deter students from disadvantaged backgrounds from attending? Not necessarily, since students who chose university could have also afforded college, but they only appear in the denominator in the ratio of college attendance (under path1). Under path 2, this is not an issue since university attendees do not make the second decision (college or no PS). Note that it is an issue under path 3, since the non-participants in the PS system are excluding from the college rate.

In the results section, I will discuss the findings from the ordinal probit model (path 1), as well as from a binary probit model of the second-stage decision under path 2 (i.e., the college decision,

conditional on not attending university). The full results from the path 2 and 3 models appear in the appendix.

4. Data

In studying access to PS education, it is ideal to have longitudinal data on youth covering their transition from high school to PS education. Alternatively, some studies have used cross-sectional data, but this carries the risk of losing family background information for PS students who have permanently moved out of their parent's home at the time of the survey. To the extent that students from higher-income families are more likely to move away to attend university or college (since they can afford to do so), a cross-sectional approach will understate the role of household income in university enrolment. Another useful data attribute in a study of PS access is a sampling frame consisting exclusively of youth. Unfortunately, most longitudinal surveys are designed to sample households, which often do not have enough sampled youth.

With these attributes in mind, the data chosen for this study are the National Longitudinal Survey of Youth, 1997 (NLSY97) in the U.S. and the Survey of Labour and Income Dynamics (SLID) in Canada.[10] The NLSY97 is a youth survey, while SLID is a large household survey. For consistency, the Panel Study of Income Dynamics (PSID) could have been used in the U.S. (since it is a household survey), but the youth samples are substantially smaller than in the NLSY97. The potentially negative impact of using different types of surveys on the level of comparability across countries is minimized, since only the information that is common to both files is used. I begin by describing the NLSY97 data since, for the most part, the study will be bound by its structure.

NLSY97

The NLSY97 is a survey of youth between the ages of 12 and 16 on December 31st, 1996. The first round of the survey was conducted in 1997, in which the family and student background information was collected from the parents and the youth.[11] The original 8,984 youth interviewed in the first round were followed-up in each subsequent year. The most recent available data are for 2001.

The analytical sample consists of youth between the ages of 14 and 16 on December 31st, 1996 who were interviewed in every year from 1997 to 2001. Students in this age range were between the ages of 19 and 21 by 2001, which gave them an ample amount of time to attend university or college. This set of restrictions yields a sample of 2,423.

The outcome variable is the highest level of studies attended in any of the five interviews (from 1997 to 2001). Note that the NLSY97 interviews are conducted during the regular school year, thus minimizing cases where actual students are not currently enrolled (e.g., during the summer).

10. The NLSY97 file used in this study is the public-use version, while the SLID file is the micro-data version.

11. I use the terms "student" and "youth" interchangeably.

Total (pre-tax) income from all sources of all members of the household is collected for the reference year 1996. Note that although *family* income is arguably preferable in general, household income is often preferred in international comparisons as a result of the different definitions of families. In any event, only the household income is available in the NLSY97.

Household income is also adjusted to account for the fact that the costs of living typically increase with the size of the household. Rather than simply divide household income by the number of household members (to create a per capita level of income), I account for possible economies of scale associated with larger households (i.e., the sharing of economic goods). While many adjustments are possible, I apply a standard approach of dividing household income by the square root of the number of household members.

I then create income quartile dummy variables based on the household's rank in the sample income distribution of their country.[12]

Another consideration with respect to measuring income at a point in time is its transient nature: income levels change from year to year, reflecting labour market and life events. To address this point, I exploit the fact that the NLSY97 contains a measure of household wealth. When I replace the income quartile dummies with similarly constructed wealth quartile dummies in the U.S., I get almost exactly the same results. This might be related to a low level of income mobility across broad categories such as quartiles.

The number of completed years of elementary-secondary (ES) schooling and PS studies of the residential and biological parents is collected in the first round interviews.[13] At most, respondents can report 12 years of ES studies, and 8 years of PS studies. Three categories are created from these responses: high school or less (no post-secondary schooling), some PS (some post-secondary schooling, but less than 4 years), and university degree holder (4 years or more of post-secondary schooling). Note that we don't actually know if the parent held a university degree, so the third category is simply meant to serve as a proxy.

As discussed below, SLID only contains information for residential parents. Thus, I use the residential parents' education in the NLSY97; however, separate analysis suggests that the distinction is inconsequential in the main findings.

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12. Since the U.S. income distribution is more dispersed than the Canadian income distribution, it is likely that average U.S. incomes would be lower at the bottom and higher at the top. In other words, the incomes corresponding to each category may be different across countries, and this could potentially explain differences in results when in fact I would like to maintain income parity within categories. To minimize this potential problem, one could fix the income thresholds to a similar dollar value applied to both countries. To this end, I have adjusted reported incomes to yield purchasing power parity (PPP) across countries and calculated quartile thresholds based on the Canadian (U.S.) income distribution and applied it to both countries. The PPP conversion factors were developed by Statistics Canada, which used final household consumption expenditure in its derivation. This exercise demonstrated very little change in the magnitude of the results to follow. For the sake of clarity, I only present results based on the relative income rank within one's own country.

13. I had to impute the parent's education with the mean value in missing cases (i.e., 'don't know' or, in the case of residential parents, the parent simply was not present). The mother's education had to be imputed in 5% (biological) and 8% (residential) of cases. The father's education had to be imputed in 13% (biological) and 29% (residential) of cases.

To partially account for the role of distance to school, I include an urban area dummy variable. Note, however, that this is not an ideal proxy for distance (Frenette, 2004). The local unemployment rate is used to proxy the opportunity cost of attending college or university (rather than working). However, the information is very limited in the public use version used here. The rate is taken from the March 1998 Current Population Survey (CPS). For individuals residing in a metropolitan area, the local area refers to the metropolitan area, while for all others it refers to the balance of the state not living in a metropolitan area. For confidentiality purposes, the rates are given in categories. It was necessary to further collapse the categories to ensure sufficient sample sizes within each cell. In the end, I use a series of dummy variables referring to the following ranges: 0 to 6 percent, 6 to 9 percent, and 9 percent or more.

Other variables used in the analysis include a female indicator variable, a visible minority indicator variable, an immigrant indicator variable, a non-majority language mother tongue indicator, all of which pose no comparability problems with SLID.[14]

SLID

The sampling frame for SLID consists of the Labour Force Survey (LFS), which is the Canadian equivalent to the CPS in the United States. Unlike most household panel surveys, respondents in SLID are only interviewed for a maximum of six years. Nevertheless, with approximately 15,000 households in each panel, the sample size is substantially larger than in most (perhaps all) household panel surveys.

To match the NLSY97, only the second SLID panel is analyzed in this study. This panel was first interviewed in 1997, at which time background information was collected, including income in 1996.

The analytical sample consists of youth between the ages of 14 and 16 on December 31st, 1996 who were interviewed in all six years from 1997 to 2002. During the study period, students in Ontario and Quebec normally attended university one year later than students from other provinces. Thus, for Ontario and Quebec, I selected students between the ages of 15 and 17 on December 31st, 1996. This set of restrictions yields a sample of 1,324.

Note that since households are asked about their activities in the previous year, in effect, the survey covers the same period as the NLSY97 (i.e., 1996 to 2001), although this needs to be further qualified. The PS enrolment status in SLID refers to the entire year (i.e., did the individual attend university last year?). This is somewhat different than in the NLSY97, where enrolment patterns are ascertained at the time of the interview, which can take place at any point in the year. Even though the NLSY97 interviews occur during the regular school year, there is a comparability issue. Specifically, if the last NLSY97 interview occurred prior to the summer (which it did in about one-half of the cases), then these students have not had as many school terms as SLID respondents in which they could have enrolled in university. This may be an issue if some lower-income students must save their money for a couple of years prior to enrolling. To verify the robustness of the results, I re-ran the models that will follow on the NLSY97 data separately for interviews that

14. Note that I define English as the majority language in the U.S., and English or French in Canada.

occurred before and after the summer of 2001, and this yielded no substantial change in the U.S. results.

Respondents in SLID can answer income questions directly (like in the NLSY97), or alternatively, they can let Statistics Canada attempt to link their information to their tax files. Although approximately two-thirds of household incomes are actually derived from tax records, this has virtually no impact on the distribution of income compared to pure survey data.[15]

As mentioned earlier, information on parental years of schooling is only available for residential parents in SLID.[16] While NLSY97 respondents can only report a maximum of 12 years of elementary-secondary schooling and 8 years of PS schooling, respondents in SLID can report up to 15 years of elementary schooling and 20 years of PS schooling. Since I create broader categories of schooling, this has no bearing on any of the analysis.

The unemployment rate was calculated directly from the March 1998 labour force activity responses in SLID. To match the NLSY97 as closely as possible, I calculated the rates within Census Metropolitan Areas (CMAs) or Census Agglomerations (CAs) for those living in such areas, and for the balance of the province for those living outside of CMAs or CAs.

5. Results

Descriptive results

I begin by describing the socio-economic characteristics of the Canadian and U.S. samples in Table 1. In absolute terms, Canadian students come from families with slightly lower socio-economic profiles on average, at least in terms of household income and parental schooling. Although a smaller proportion of Canadian students are members of a visible minority group, there are relatively more immigrants and/or students who speak a non-majority mother tongue. Canadian students are also more likely to live in an urban area, which may partially explain why they generally have greater local access to public universities (as noted in the introduction). The unemployment rate faced by students in the critical decision-making years is generally higher in Canada than in the United States.

15. See Frenette, Green, and Picot (2004) for a comparison of the income distribution in SLID and in the Survey of Consumer Finances (SCF), which collects income data by response.

16. Once again, I had to impute the parents' years of schooling with the mean value in missing cases. The mother's education had to be imputed in 5% of cases, while the father's education had to be imputed in 16% of cases.

Table 1: Mean socio-economic characteristics of students

	Canada	U.S.
Household income[a]	30,789	34,528
Father has HS or less	0.334	0.322
Father has some PS	0.464	0.459
Father has university degree	0.202	0.220
Mother has HS or less	0.425	0.455
Mother has some PS	0.411	0.331
Mother has university degree	0.164	0.214
Female	0.501	0.504
Visible minority	0.122	0.228
Immigrant	0.088	0.041
Non-majority mother tongue	0.134	0.041
Urban area	0.808	0.687
Unemployment rate<6%[b]	0.412	0.751
6%<=Unemployment rate< 9%[b]	0.258	0.186
Unemployment rate>=9%[b]	0.331	0.063
14 years old on December 31st, 1996[c]	0.331	0.335
15 years old on December 31st, 1996[c]	0.339	0.338
16 years old on December 31st, 1996[c]	0.330	0.327
N	1,324	2,423

[a] Refers to the adult-equivalent household income from all sources before taxes in 1996, in 1996 Canadian dollars. The U.S. figure is adjusted for Purchasing Power Parity to Canadian dollars.
[b] Due to limitations in the U.S. data, the unemployment rate refers to March, 1998 for both countries(see text for more details).
[c] By sample selection, Ontario and Quebec students were one year older (see text for more details).

Although the differences across countries are interesting in their own right, what is important to note about Table 1 is that each sample is drawn from a very heterogeneous population made up of students from very different socio-economic backgrounds. In the econometric section, differences in these characteristics will be taken into account in the results.

Before moving on to the econometric results, however, it is worthwhile to look at some descriptive evidence of post-secondary enrolment patterns (Table 2). First, note that Canadian students are more likely to attend some form of post-secondary school than U.S. students (67% compared to 57%); however, this is all due to a much higher rate of college going in Canada (34%) than in the U.S. (18%). In fact, U.S. students are substantially more likely to attend a university (39%) than Canadian students (33%).

Table 2: Post-secondary enrolment rates by socio-economic characteristic

	University		College		College (conditional)[a]		Total PS	
	Canada	U.S.	Canada	U.S.	Canada	U.S.	Canada	U.S.
Overall	0.332	0.389	0.336	0.180	0.502	0.294	0.667	0.569
1st income quartile	0.240	0.153	0.322	0.165	0.424	0.195	0.563	0.318
2nd income quartile	0.243	0.321	0.383	0.207	0.505	0.305	0.625	0.528
3rd income quartile	0.381	0.449	0.327	0.185	0.528	0.336	0.708	0.634
4th income quartile	0.463	0.635	0.311	0.161	0.579	0.439	0.774	0.795
Father has HS or less	0.256	0.275	0.336	0.185	0.452	0.256	0.592	0.460
Father has some PS	0.294	0.323	0.347	0.196	0.491	0.290	0.640	0.519
Father has university degree	0.544	0.694	0.309	0.137	0.679	0.446	0.854	0.830
Mother has HS or less	0.229	0.264	0.358	0.190	0.464	0.258	0.586	0.454
Mother has some PS	0.362	0.394	0.308	0.182	0.483	0.300	0.670	0.576
Mother has university degree	0.524	0.647	0.348	0.153	0.731	0.435	0.872	0.801
Males	0.260	0.345	0.350	0.165	0.473	0.252	0.610	0.510
Females	0.403	0.433	0.321	0.194	0.538	0.341	0.724	0.626
Non-visible minority	0.302	0.411	0.351	0.176	0.502	0.298	0.653	0.587
Visible minority	0.545	0.316	0.228	0.192	0.501	0.281	0.773	0.508

[a] Calculated among non-university participants.

The greater propensity among U.S. students to go on to university can be seen across most of the income distribution. In the top income quartile, 63% of U.S. students go on to university, compared to only 46% of Canadian students. Similar patterns emerge in the third and second income quartile. In a complete reversal, however, only 15% of U.S. students in the bottom income quartile go on to university, compared to 24% in Canada. In fact, Canadian students are just as likely to go on to university whether they are in the bottom or second income quartile. This is quite a significant finding, since it suggests that the relationship between university going and income in Canada can only be seen once we look at the top half of the income distribution. In contrast, U.S. students in the second income quartile are more than twice as likely to go on to university as students in the bottom quartile.

Students with a parent who holds a university degree are considerably more likely to attend university than other students. Although this is true in both countries, the difference is moderately stronger in the United States. Females are also more likely to go on to university, and the relative advantage is moderately larger in Canada. While members of a visible minority group are far more likely to attend university in Canada, they are somewhat less likely to do so in the United States.

In terms of college-going, the rates are calculated in two ways. When all students are included in the calculation (column labelled 'College'), it is evident that college-going is not strongly related to any socio-economic characteristic in either country, except that in Canada, non-members of a visible minority group are more likely to go to college than members of a visible minority group.

A slightly different picture of college-going emerges once I condition on non-university participation. First, the rates now vary by income group, although still not as much as in the case of university-going. Once again, the variation is larger in the U.S. Having a parent with a university degree is now strongly associated with college-going in both countries. Females are now slightly

more likely to attend college. And in the case of Canada, members of a visible minority group are now as likely to attend college as non-members. In short, when I observe non-university participants, the issues surrounding access to college begin to look more similar to those surrounding access to university (although on a smaller scale).

Econometric results

In Table 3, I show results from an ordered probit model of post-secondary choice, which is described in Section 3. Since the coefficients are difficult to interpret, I will focus on the marginal probability effects, which appear separately for college-going and university-going. Each variable in the model is interacted with a U.S. dummy variable.[17]

Beginning with the university results, I note that the findings on household income concur with the descriptive evidence in Table 2. In Canada, students in the top income quartile enjoy a large advantage in attending university over students in the bottom quartile (21 percentage points). However, this is only about half of the advantage enjoyed by U.S. students in the top income quartile over students in the bottom income quartile (42 percentage points).[18] Furthermore, the gap between the bottom and second income quartiles in the U.S. is 20 percentage points (significant), compared to 2 percentage points (not significant) in Canada.

Students whose parents hold a university degree have a considerable advantage in going on to university themselves over students with less educated parents. In Canada, for example, there is a 19 (15) percentage point difference in university-going between students whose father (mother) held a university degree compared to students whose father (mother) did not attend PS schooling. Although the estimated relationship is slightly higher in the U.S., the differences between countries are not statistically significant.

Another group that enjoys a similar advantage in both countries is females. In Canada, they hold a 15 percentage point advantage over males. In the U.S., the gap is slightly smaller at 12 percentage points. As with parental education, the difference between the two countries is not statistically significant.

The experience of members of visible minority groups is quite different across countries. In Canada, they hold a 20 percentage point advantage in university-going. In the U.S., this drops to 4 percentage points, and is not statistically significant. Recall that in the raw data, members of a visible minority group in the U.S. are less likely to go on to university than non-members. The econometric results suggest that this is due to differences in observable socio-economic characteristics (e.g., parental income or education).

17. Note that the SLID and the NLSY97 samples are drawn from complex survey designs. Since standard variance formulae assume simple random samples, the variance estimates differ considerably from true variances. Unfortunately, the information required to calculate correct variances is not available to non-U.S. researchers using the NLSY97. However, the significance of the main Canadian results did not change when I calculated bootstrap variances with 50 bootstrap sampling weights. These results are available upon request.

18. The U.S. value is obtained by adding the Canadian coefficient (0.2098) and the coefficient on the U.S. interaction term (0.2085).

Table 3: Ordered probit results, educational outcomes of youth[a]

	Coefficient	Z	College-going Marg. prob.	Z	University-going Marg. prob.	Z
2nd income quartile	0.0532	0.37	0.0004	0.58	0.0201	0.37
3rd income quartile	0.3890	2.58	-0.0045	-0.86	0.1494	2.54
4th income quartile	0.5445	3.48	-0.0110	-1.37	0.2098	3.44
Father has some PS	0.0626	0.52	0.0006	0.54	0.0235	0.52
Father has university degree	0.4989	3.05	-0.0106	-1.22	0.1928	3.00
Mother has some PS	0.2358	2.00	0.0005	0.34	0.0894	1.98
Mother has university degree	0.3936	2.35	-0.0062	-0.87	0.1518	2.32
Female	0.3989	3.83	0.0043	2.02	0.1487	3.84
Visible minority	0.5210	2.45	-0.0120	-1.01	0.2015	2.42
Immigrant	-0.2110	-0.85	-0.0068	-0.51	-0.0761	-0.89
Non-majority mother tongue	0.3040	1.47	-0.0062	-0.59	0.1181	1.44
Urban area	0.0061	0.04	0.0001	0.04	0.0023	0.04
6%<=Unemployment rate<9%	0.1652	1.23	-0.0002	-0.09	0.0629	1.21
Unemployment rate>=9%	0.2493	1.96	-0.0031	-0.67	0.0962	1.93
15 years old on December 31st, 1996	-0.0695	-0.54	-0.0009	-0.45	-0.0260	-0.55
16 years old on December 31st, 1996	0.2506	1.97	0.0002	0.09	0.0951	1.95
U.S.	-0.3433	-1.49	0.0062	0.58	-0.1329	-1.45
2nd income quartile*US	0.4910	3.10	-0.0103	-1.24	0.1898	3.07
3rd income quartile*US	0.3744	2.28	-0.0052	-0.81	0.1442	2.26
4th income quartile*US	0.5391	3.15	-0.0129	-1.31	0.2085	3.14
Father has some PS*US	0.1290	0.99	0.0010	1.17	0.0486	0.99
Father has university degree*US	0.1687	0.95	-0.0003	-0.10	0.0643	0.94
Mother has some PS*US	-0.0965	-0.75	-0.0015	-0.57	-0.0359	-0.76
Mother has university degree*US	0.0985	0.55	0.0003	0.41	0.0374	0.54
Female*US	-0.0788	-0.70	-0.0009	-0.62	-0.0295	-0.70
Visible minority*US	-0.4460	-2.03	-0.0180	-1.20	-0.1572	-2.19
Immigrant*US	0.4899	1.80	-0.0197	-0.83	0.1921	1.78
Non-majority mother tongue*US	-0.3562	-1.51	-0.0168	-0.87	-0.1240	-1.66
Urban area*US	-0.0841	-0.58	-0.0007	-0.69	-0.0316	-0.59
6%<=Unemployment rate<9%*US	-0.0079	-0.05	-0.0001	-0.05	-0.0030	-0.05
Unemployment rate>=9%*US	-0.3806	-2.45	-0.0182	-1.42	-0.1321	-2.68
15 years old on December 31st, 1996*US	0.3379	2.44	-0.0019	-0.57	0.1291	2.41
16 years old on December 31st, 1996*US	-0.0538	-0.39	-0.0007	-0.32	-0.0201	-0.39
μ_1	0.7008	3.26				
μ_2	1.3087	6.06				
N	3747					
Log L[b]	-3480					

[a] The outcomes are ordered as follows: no PS (0), college (1), and university (2). Also note that path 1 is followed in this model (see text for more details).

[b] log likelihood.

In terms of college-going, the ordinal probit shows very few discernable differences within countries, and none across countries. In fact, only the female indicator variable in Canada is significant (at 5%) and it is very small empirically. This gives the impression that college is highly accessible in Canada and the U.S., but as discussed in the methods section, it may be misleading

since students who chose university could also afford college. Thus, it may be preferable to simply exclude students who chose university when assessing college accessibility.

In the appendix, I show marginal probability effects from a series of binary probit models used to analyze choices made under different decision paths (described in the methods section). In stage 2 of path 2 (Table A1), the college choice is modeled among students who chose not to attend university. From these results, we see a different pattern of college access emerging. First, there is some (weak) evidence that household income matters. In Canada, students in the top income quartile have a 13 percentage point advantage over students in the bottom income quartile, although this just fails the significance test at 10%. In the U.S., the relationship is stronger, as there is a 26 percentage point gap. Although the income-access gap in the U.S. is not significantly different than the Canadian gap, it is significantly different from zero. In Canada, having a university-educated parent seems to matter a lot. In fact, the relationship between college-going and having a university-educated mother is stronger than what is shown in Table 3 in terms of university-going. Although the U.S. estimates are not significantly different than the Canadian estimates, they are smaller in magnitude. Finally, there is some (weak) evidence that females are more likely to go on to college in both countries.

6. Discussion of results

Although university-going is more common in the U.S., this is largely driven by greater participation among students from more well-to-do families. Students in the bottom income quartile in the U.S. are actually less likely to attend university than their Canadian counterparts. This finding may explain why there is less intergenerational earnings mobility in the U.S. than in Canada (Solon, 2002). In other words, children from disadvantaged backgrounds in the U.S. may be less likely than their Canadian counterparts to escape the plight of their parents because of reduced educational opportunities.

As noted in the introduction, the Canada-U.S. difference in the income access gap may be partly the result of the greater presence of private universities in the U.S., as well as higher tuition fees even among its public universities.

Another possible explanation is a stronger correlation between unobserved abilities and household income in the U.S. than in Canada. In other words, it may be the case that the larger income access gap observed in the U.S. is simply the result of a larger gap in abilities among students across the income distribution.

Kane (2001) lists four approaches that have been used to account for differences in unobserved abilities across the income distribution. The first approach uses available information on proxies for abilities, such as test scores, parental education, etc. The second approach exploits large, temporary variation in household income. The third approach rank orders students by income percentile and correlates changes in average income by percentile with changes in enrolment rates. The fourth approach involves randomly assigning income transfers to parents and observing enrolment patterns of their children. Up to this point, the ability bias has been addressed in a manner that is similar to the first approach listed above, insomuch as differences in parental education and other socio-economic characteristics are taken into account.

In light of the comparative nature of this study, there is no better information on student abilities in the NLSY97 and SLID. Nevertheless, the NLSY97 does contain measures of abilities in the computer-adaptive form of the Armed Services Vocational and Aptitude Battery (ASVAB), which was administered in the first interview. I begin by estimating an ordinal probit model similar to the one shown in Table 3, but only on U.S. students with test score information (2,417 in total). I then re-estimate the model with the ASVAB scores added. Note that the score distribution is standardized to have a mean of zero and a variance of one. The marginal effects on the probability of going on to university appear in Table 4.

Table 4: Marginal probability effects on university-going from an ordered probit model, U.S. youth[a]

	No ASVAB score		ASVAB scores added	
	Marg. prob.	Z	Marg. prob.	Z
2nd income quartile	0.2071	7.28	0.1246	4.10
3rd income quartile	0.2906	10.21	0.1625	5.15
4th income quartile	0.4050	14.24	0.2660	7.89
Father has some PS	0.0709	3.13	0.0375	1.60
Father has university degree	0.2541	8.11	0.1878	5.55
Mother has some PS	0.0526	2.36	0.0274	1.19
Mother has university degree	0.1878	6.30	0.0950	3.06
Female	0.1181	6.34	0.0647	2.73
Visible minority	0.0283	1.17	0.1263	4.52
Immigrant	0.1065	2.08	0.0562	1.07
Non-majority mother tongue	-0.0186	-0.37	0.1101	1.88
Urban area	-0.0288	-1.36	-0.0449	-2.02
6%<=Unemployment rate<9%	0.0593	2.34	0.0905	3.33
Unemployment rate>=9%	-0.0478	-1.28	-0.0147	-0.37
15 years old on December 31st, 1996	0.1001	4.27	0.0330	1.35
16 years old on December 31st, 1996	0.0727	3.09	-0.0061	-0.25
General science/100			0.0073	2.88
Arithmetic reasoning/100			0.0027	1.21
Word knowledge/100			0.0033	1.48
Paragraph comprehension/100			0.0043	2.13
Numerical operations/100			0.0014	5.77
Coding speed/100			-0.0001	-0.36
Automobile information/100			-0.0055	-2.30
Shop information/100			-0.0073	-3.21
Mathematics knowledge/100			0.0156	7.51
Mechanical comprehension/100			0.0006	0.25
Electronics information/100			0.0019	0.98
Assembling objects/100			0.0006	0.38

[a] The sample in both models consist of 2,417 youth who were administered the computer-adaptive form of the Armed Services Vocational and Aptitude Battery (ASVAB) in the 1997 interview. Also note that path 1 is followed in this model (see text for more details).

First, note the statistically significant relationship between certain ability proxies and university-going (e.g., general science, paragraph comprehension, numerical operations, and mathematics knowledge). Prior to adding the ASVAB scores, students in the top income quartile had a 41

percentage point advantage in university-going over students in the bottom income quartile (left hand panel). Although the addition of the ASVAB scores in the model has the effect of narrowing the gap from 41 to 27 percentage points (a 34% decline), the residual gap is still substantial (right hand panel).[19] The gap that remains after controlling for abilities in the U.S. data is still considerably larger than what we observed earlier in the Canadian data (21 percentage points), and this is the case despite the fact that ability differences are not taken into account in the Canada sample.

Although it is difficult to know how the addition of abilities would affect the Canadian results (if a proxy were available), it is clear that only in a situation where abilities are *negatively* correlated with household income would we see the income access gap rise.

As a result, it is likely that the larger income access gap found in the U.S. is not entirely attributable to a stronger relationship between abilities and household income.

A third possible explanation for the stronger relationship between university-going and income in the U.S. is heterogeneous school quality. In other words, the returns associated with the more affordable universities in the U.S. may not warrant the investments for many lower-income students. Brewer, Eide, and Ehrenberg (1999) estimate a large premium to attending an elite private university, and a smaller premium to attending middle-rated private universities, relative to bottom-rated public universities in the United States. However, Betts, Ferrall, and Finnie (2000) also find large variations in the earnings of Canadian graduates by various measures of university quality. A detailed comparative study would be needed to assess the validity of this hypothesis.

Why do members of a visible minority group have an advantage in university participation in Canada, but not in the U.S.? Two possibilities come to mind. The first is that members of a visible minority group in the U.S. may have a lower perception of the economic returns associated with a university degree than their counterparts in Canada. Unfortunately, the NLSY and SLID samples are not sufficiently large to allow for detailed analysis by visible minority group. To address this question, I turn to the Canadian and U.S. census data. In Table 5, I show the median annual earnings of high school and university graduates by visible minority status among 25- to 34-year old full-year/full-time workers in both countries.

19. Carneiro and Heckman (2002) use the Armed Forces Qualifications Test (AFQT) on the original NLSY cohort of 1979, and find that although a residual relationship persists after controlling for AFQT scores, the income access gap is reduced substantially. Recall that Ellwood and Kane (2000) found that the income access gap rose in the U.S. over the 1980s. It could be the case that income matters more in recent years.

Table 5: Median annual earnings by visible minority status[a]

	Canada			U.S.		
	High school	University	% difference	High school	University	% difference
White	30,767	41,811	35.9	34,450	50,350	46.2
Black	26,664	37,945	42.3	30,475	43,725	43.5
Asian[b]	25,639	39,996	56.0	33,125	59,625	80.0
Hispanic	25,639	35,894	40.0	30,475	42,400	39.1
Aboriginal	25,639	38,369	49.7	27,825	39,750	42.9
Other VM	26,645	41,022	54.0	30,475	46,375	52.2

[a] The samples consist of all full-year/full-time workers between 25 and 34 years old selected from the 2001 Canadian Census and the 2000 U.S. Census. Earnings refer to the year prior to the Census in both cases.
[b] Includes East, Southeast, and South Asians. Middle-Eastern Asians are in 'Other VM'.

The results clearly suggest that for most groups, the economic returns to obtaining a university degree are no higher in Canada than in the U.S. In fact, they are substantially higher among Asians in the U.S., compared to their Canadian counterparts. The returns are somewhat higher among aboriginals in Canada, but this is a small group.

Another possibility is simply a difference in the composition of the visible minority population. In the top portion of Table 6, I use Canadian and U.S. census data to show the proportion of 25 to 34 year old members of various visible minority groups holding a university degree in both countries (along with their share of all members of a visible minority group).

Table 6: Decomposition of the Canada-U.S. gap in the proportion of VM with a university degree[a]

	Canada		U.S.	
	Share of VM population	Proportion with a university degree	Share of VM population	Proportion with a university degree
Black	0.132	0.183	0.472	0.153
Asian[b]	0.527	0.410	0.184	0.534
Hispanic	0.049	0.188	0.316	0.081
Aboriginal	0.191	0.062	0.022	0.103
Other VM	0.102	0.339	0.006	0.312
Total VM	1.000	0.296	1.000	0.200
White	0.000	0.237	0.000	0.305
	Decomposition method 1[c]		Decomposition method 2[c]	
Canada-U.S. gap in VM with a university degree		0.095		
Compositional effect	0.156		0.071	
Structural effect	-0.061		0.024	

[a] The samples consist of all individuals between 25 and 34 years old selected from the 2001 Canadian Census and the 2000 U.S. Census.
[b] Includes East, Southeast, and South Asians. Middle-Eastern Asians are in 'Other VM'.
[c] See text for detailed formulae.

First, note that the census data also suggest a higher rate of university-going in the U.S. than in Canada in general (see the row labelled 'White'). Among members of a visible minority group, 30% of Canadians have a university degree, compared to only 20% in the U.S. This appears to be explained by a larger proportion of Asians in Canada (who have a high rate of university attainment), as well as a smaller proportion of Blacks in Canada (who have a low rate of university attainment).

In the bottom portion of Table 6, I decompose the Canada-U.S. gap in university attainment among members of a visible minority group (9.5%). This gap can be expressed as:

$$GAP_{can-us} = \sum_i S_{can,i} P_{can,i} - \sum_i S_{us,i} P_{us,i}$$

The proportion holding a university degree is denoted by P, while S denotes the share of the visible minority population. Each visible minority group is denoted by the subscript i. In the first decomposition method, I add and subtract the term $\sum_i S_{can,i} P_{us,i}$ to the right-hand side. After rearranging terms and expressing the right-hand side in matrix form (denoted by deleting the subscript i), we get:

Decomposition method 1: $GAP_{can-us} = S'_{can}(P_{can} - P_{us}) + (S'_{can} P_{us} - S'_{us} P_{us})$

In short, the total gap is the sum of the structural effect (i.e., due to a difference in P) and the compositional effect (i.e., due to a difference in S). In the second method, I simply add and subtract the term $\sum_i S_{us,i} P_{can,i}$, which yields:

Decomposition method 2: $GAP_{can-us} = S'_{us}(P_{can} - P_{us}) + (S'_{can} P_{can} - S'_{us} P_{can})$

In the bottom portion of Table 6, we see that both methods point to compositional differences as underlying the overall gap. In method 1, more than 100% of the gap is explained by compositional differences, while almost three-quarters of the gap is explained by compositional differences in method 2.

7. Conclusion

A considerable body of evidence has recently emerged to suggest that access to a post-secondary education is not equally distributed in many countries. Specifically, students from more advantageous socio-economic backgrounds hold a considerable advantage, especially with respect to university participation. The objective of this study was to compare the different experiences of Canadian and U.S. students with regards to post-secondary access.

The main finding is that two groups of students are disadvantaged in going on to university in the U.S. compared to Canada. These include students from lower-income families, as well as members of a visible minority group. In terms of college-going, the study showed very little relationship with socio-economic background when I included students who chose university (and can thus afford college). When I excluded these students, the patterns were qualitatively similar to those observed in studying university access, although they weren't as pronounced.

Students in the bottom income quartile in the U.S. are considerably less likely to go on to university than their Canadian counterparts. In Canada, 24% of these students go on to university (shortly after high school), compared to only 15% in the United States. The lower rate in the U.S. is important in light of the fact that at higher income levels, U.S. students are far more likely to go on to university than Canadian students. These results held up in the econometric evidence presented, where differences in parental education, sex, and various other socio-economic background characteristics were taken into account.

Although it is difficult to attribute these differences to specific factors, some candidates have been identified as likely, while others less so. Specifically, the higher costs of attending university in the United States. may explain why U.S. students in the bottom income quartile are less likely to go to university than observably similar Canadian students, despite the fact that at higher income levels, U.S. students are far more likely to go on. The higher costs in the U.S. can be explained by the strong presence of private universities, a substantially lower level of local access to public universities, and the higher costs of those public universities even when they are locally available.

Another candidate is a difference in the abilities of students across the income distribution in Canada and the U.S. Although I have shown that ability differences explain about one-third of the gap in university participation between the top and bottom income quartiles in the U.S., the residual gap is still substantially larger than what is observed in Canada (even without controlling for abilities). However, ability differences may still explain part of the gap across countries.

A third possible factor is a difference in the level of heterogeneity in university quality across countries. Studies in Canada and the U.S. suggest that university quality affects future earnings, but to date, no studies have compared the two countries in this regard.

Students who are members of a visible minority group in the U.S. are also at a disadvantage in university-going compared to their Canadian counterparts, although within countries, neither group is at a disadvantage. In the U.S., these students are as likely as other students to go on to university once differences in observable socio-economic characteristics are taken into account. In contrast, Canadian members of a visible minority group are far more likely to go on to university than other students.

In terms of possible reasons behind the differences across countries, two candidates were investigated. In both cases, I had to turn to census data on university attainment to obtain larger samples. The first possibility related to higher returns associated with a university degree in Canada compared to the U.S. for these individuals. However, the data are not supportive of this hypothesis.

The second possibility related to differences in the composition of the visible minority population across countries (e.g., proportion of Blacks, Asians, etc.). In Canada, there are relatively more Asians (a group with a high level of university attainment) and fewer blacks (a group with a low level of university attainment). Decomposition results suggest that the majority of the gap in university attainment between members of a visible minority group in both countries can indeed be attributed to differences in composition of the visible minority population.

Appendix

Table A1: Marginal probability effects from binary probit models[a]

	Stage 1 (university/not)		Stage 2 (college/not)	
	Marg. prob.	Z	Marg. prob.	Z
2nd income quartile	-0.0064	-0.09	0.0557	0.84
3rd income quartile	0.1911	2.73	0.0750	1.03
4th income quartile	0.2481	3.48	0.1302	1.63
Father has some PS	0.0130	0.23	0.0410	0.77
Father has university degree	0.2075	2.84	0.1613	1.73
Mother has some PS	0.1370	2.47	0.0135	0.25
Mother has university degree	0.1586	2.10	0.2104	2.12
Female	0.1787	3.90	0.0845	1.71
Visible minority	0.2874	3.17	-0.0582	-0.50
Immigrant	-0.0572	-0.57	-0.0846	-0.75
Non-majority mother tongue	0.1117	1.15	0.1581	1.41
Urban area	-0.0132	-0.21	0.0320	0.53
6%<=Unemployment rate<9%	0.0384	0.62	0.1002	1.51
Unemployment rate>=9%	0.0905	1.52	0.1114	1.69
15 years old on December 31st, 1996	-0.0227	-0.39	-0.0221	-0.38
16 years old on December 31st, 1996	0.1078	1.86	0.0788	1.26
U.S.	0.0271	0.26	-0.2333	-2.07
2nd income quartile*US	0.2102	2.68	0.0909	1.22
3rd income quartile*US	0.1059	1.36	0.0942	1.16
4th income quartile*US	0.1644	2.03	0.1261	1.42
Father has some PS*US	0.0509	0.85	0.0114	0.19
Father has university degree*US	0.0473	0.61	-0.0499	-0.57
Mother has some PS*US	-0.0690	-1.22	-0.0060	-0.10
Mother has university degree*US	0.0340	0.43	-0.0980	-1.18
Female*US	-0.0759	-1.53	0.0215	0.40
Visible minority*US	-0.2325	-3.28	0.0958	0.73
Immigrant*US	0.1646	1.33	0.1794	1.13
Non-majority mother tongue*US	-0.1410	-1.64	-0.1245	-1.41
Urban area*US	-0.0266	-0.41	-0.0271	-0.40
6%<=Unemployment rate<9%*US	0.0313	0.47	-0.0787	-1.26
Unemployment rate>=9%*US	-0.1669	-3.12	-0.0595	-0.90
15 years old on December 31st, 1996*US	0.1145	1.78	0.1104	1.64
16 years old on December 31st, 1996*US	-0.0398	-0.67	-0.0178	-0.27

[a] Path 2 is followed in this model (see text for more details).

Table A2: Marginal probability effects from binary probit models[a]

	Stage 1 (PS/not)		Stage 2 (university/not)	
	Marg. prob.	Z	Marg. prob.	Z
2nd income quartile	0.0540	0.86	-0.0401	-0.50
3rd income quartile	0.1521	2.45	0.1311	1.83
4th income quartile	0.2039	3.27	0.1733	2.36
Father has some PS	0.0366	0.69	0.0013	0.02
Father has university degree	0.2040	3.01	0.1406	1.88
Mother has some PS	0.0696	1.35	0.1235	2.13
Mother has university degree	0.2111	2.94	0.0798	1.08
Female	0.1526	3.28	0.1429	2.65
Visible minority	0.1290	1.41	0.2314	3.13
Immigrant	-0.0735	-0.62	-0.0440	-0.35
Non-majority mother tongue	0.1495	1.84	0.0589	0.62
Urban area	0.0233	0.38	-0.0245	-0.35
6%<=Unemployment rate<9%	0.0945	1.64	-0.0045	-0.07
Unemployment rate>=9%	0.1326	2.56	0.0269	0.43
15 years old on December 31st, 1996	-0.0277	-0.48	-0.0136	-0.20
16 years old on December 31st, 1996	0.1159	2.06	0.0681	1.10
U.S.	-0.1466	-1.64	0.2325	1.67
2nd income quartile*US	0.1518	2.42	0.1279	1.67
3rd income quartile*US	0.1242	1.83	0.0348	0.41
4th income quartile*US	0.1860	2.74	0.0503	0.58
Father has some PS*US	0.0390	0.69	0.0249	0.36
Father has university degree*US	0.0212	0.25	0.0217	0.26
Mother has some PS*US	-0.0231	-0.41	-0.0732	-1.04
Mother has university degree*US	-0.0458	-0.50	0.0515	0.62
Female*US	-0.0195	-0.38	-0.1085	-1.86
Visible minority*US	-0.1032	-0.99	-0.2813	-2.52
Immigrant*US	0.1746	1.74	0.0847	0.73
Non-majority mother tongue*US	-0.1785	-1.64	-0.1201	-0.88
Urban area*US	-0.0451	-0.71	-0.0165	-0.22
6%<=Unemployment rate<9%*US	-0.0403	-0.60	0.0527	0.75
Unemployment rate>=9%*US	-0.1687	-2.39	-0.1418	-1.60
15 years old on December 31st, 1996*US	0.1337	2.31	0.0488	0.69
16 years old on December 31st, 1996*US	-0.0360	-0.57	-0.0504	-0.70

[a] Path 3 is followed in this model (see text for more details).

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